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The rhodolith pavement of the Punta Guitja section, Lampedusa Formation (Upper Miocene - Island of Lampedusa, Pelagian Block). Preliminary note

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ABSTRACT – The rhodolith pavement exposed in the middle part of the Punta Guitja section (Cala Pisana Member, Lampedusa Formation, Tortonian - Lower Messinian) is briefly described. Rhodolithic rudstones with bivalves, gastropods and benthic foraminifers form the algal layer. The rhodoliths have sphaeroidal or ellipsoidal shape; the coating sequence is composed of the species *Titanoderma cystoseirae*, *Spongites albanensis*, *Lithoporella quadratica*, *Lithothamnion valens*, *Lithothamnion florea brassica* and *Lithothamnion iharai*.

RIASSUNTO – [Il "pavimento a rodoliti" della sezione di Punta Guitja, Formazione di Lampedusa (Miocene superiore - Isola di Lampedusa, Blocco Pelagiano)] – In questa nota viene preliminarmente descritto e commentato il "pavimento a rodoliti" esposto nella sezione di Punta Guitja compresa nel Membro di Cala Pisana della Formazione di Lampedusa (Tortoniano - Messiniano inferiore). Lo strato algale è costituito da rudstones a rodoliti in cui sono dispersi Bivalvi, Gasteropodi e Foraminiferi bentonici. Le rodoliti hanno geometria sferoidale od ellittica e sono costituite dalle specie *Titanoderma cystoseirae*, *Spongites albanensis*, *Lithoporella quadratica*, *Lithothamnion valens*, *Lithothamnion florea brassica* e *Lithothamnion iharai*.

INTRODUCTION AND GEOLOGICAL SETTING

The Pelagian Islands (Lampione, Lampedusa and Linosa) lie about 200 km SSW of Sicily (Text-fig. 1). Linosa, the northernmost of the three islands, is volcanic, while Lampione and Lampedusa are composed of carbonate rocks, of middle-late Eocene and Tortonian and to possibly early Messinian age, respectively.

The islands of Lampedusa and Lampione are small subaerial exposures of the middle part of the Pelagian Block, which is bordered by the N-S striking structures of the Tunisia shelf to the west and by the Hyblean Plateau (SE Sicily) and the Malta shelf to the east. The Pelagian Block links the African Plate to the front of the Maghreb-Sicilian belt.

Grasso & Pedley (1985) include the carbonate sediments of Lampedusa into the Lampedusa Formation, which shows the maximum thickness of about 130 m, outcropping along a steeply cliff on the northern coast of the island. According to Grasso & Pedley (1985), the Lampedusa Formation includes the following members (from bottom to top): Cala Pisana Member, Capo Grecale Member and Vallone della Forbice Member. The characters of the three members can be summarized as follows (Grasso & Pedley, 1985): Cala Pisana Member - *Porites* reef limestone (Punta Maccaferri Beds), rhodolith pavement and oolitic and algal limestone (Punta Guitja Beds); Capo Grecale Member - foraminiferal and algal packstone and wackestone (Vallone Imbriacoli Beds) followed by brecciated and slumped wacke-

stone and mudstone with reworked clasts supplied by the reefal bedrocks (Cala Calandra Beds); Vallone della Forbice Member - well bedded dolomite packstone.

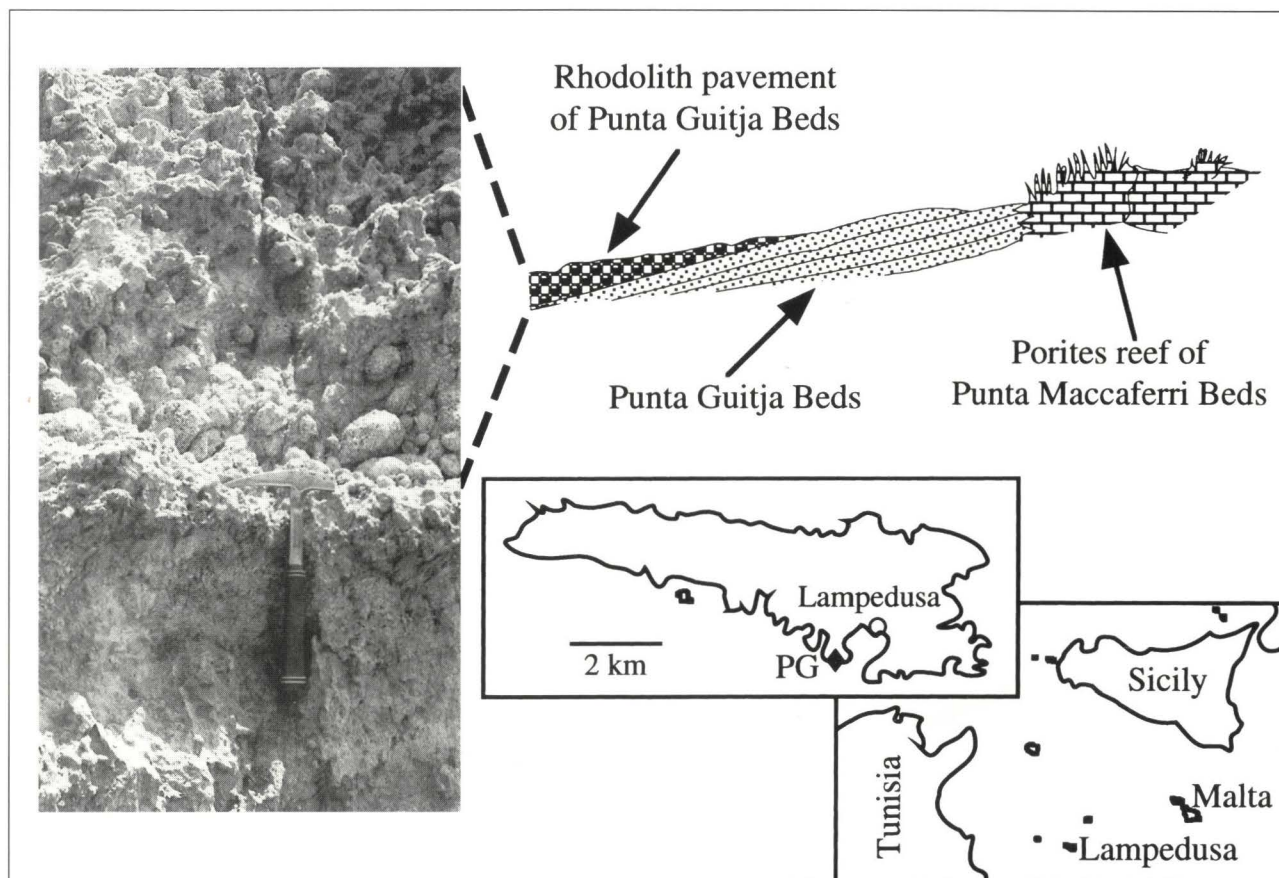
Field work was carried out in 1994 and 1996 and samples were obtained from three stratigraphic sections (Punta Maccaferri, Punta Guitja and Cala Pisana) along which the different facies of the Cala Pisana Member are exposed.

Interestingly, a rhodolithic rudstone bed is present in the middle part of the Punta Guitja section; Grasso & Pedley (1985) identified this algal body as a rhodolith pavement located in a fore-reef ramp environment.

This work is a preliminary report on the rhodolith pavement of the Punta Guitja section. Detailed lithostratigraphic and paleoalgal studies on the sections of Punta Maccaferri, Punta Guitja and Cala Pisana are in progress.

THE RHODOLITH PAVEMENT OF THE PUNTA GUITJA SECTION

The section crops out along the cliff, 300 m west of Punta Guitja (Text-fig. 1). According to Grasso & Pedley (1985) the lithostratigraphic succession can be summarized as follow (from bottom to top): a) burrowed grey packstone (1-2 m), b) rhodolithic algal pavement (1-2 m), and c) oolite (1-2 m). Grasso & Pedley (1985) state that this section represents the wedge-shaped sedimentary bodies of the inner fore-reef facies; these carbonate deposits are banked



Text-fig. 1 - View of the rhodolith pavement and its location in the paleoenvironmental reconstruction depicted by Grasso & Pedley (1985); in the insert the location of the Island of Lampedusa and of the lithostratigraphic section of Punta Guitja (PG) are shown (from Grasso & Pedley, 1985, redrawn and modified).

against the reef wall. According to Grasso & Pedley (1985) levels a) and b) represent the fore-reef ramp facies, the inner part (i.e. closet to the reef) of which has a paleoedepth of 10-15 m.

The rhodolithic algal pavement consists of rhodolithic rudstones with bivalves, gastropods, benthic foraminifers and green algae (*Halimeda*, rare *Acicularia*). The rhodoliths have a sphaeroidal shape (diameter: 2-8 cm) and ellipsoidal (axes: 6-13 x 5-12 x 2-7 cm), and bioclastic nucleus; they are comparable with class III and IV of Bosence (1983a) and have columnar growth morphology (*sensu* Bosence, 1983a). Few rhodoliths exhibit branching growth in the outer part.

In the coating sequences lumpy thalli are dominant, but crustose-lumpy morphology also uncommonly occurs; branching thalli are very rarely observed in the outer part of few rhodoliths.

The following species form the algal assemblage (Pl. 1):

Titanoderma cystoseirae (Hauck) Woelkerling, Chamberlain & Silva, 1985

Spongites albanensis (Lemoine) Braga, Bosence & Steneck, 1993

Lithoporella quadratica Ishijima, 1933

Lithothamnion valens Foslie, 1909

Lithothamnion florea brassica (Millet) Lemoine, 1923

Lithothamnion iharai Ishijima, 1954

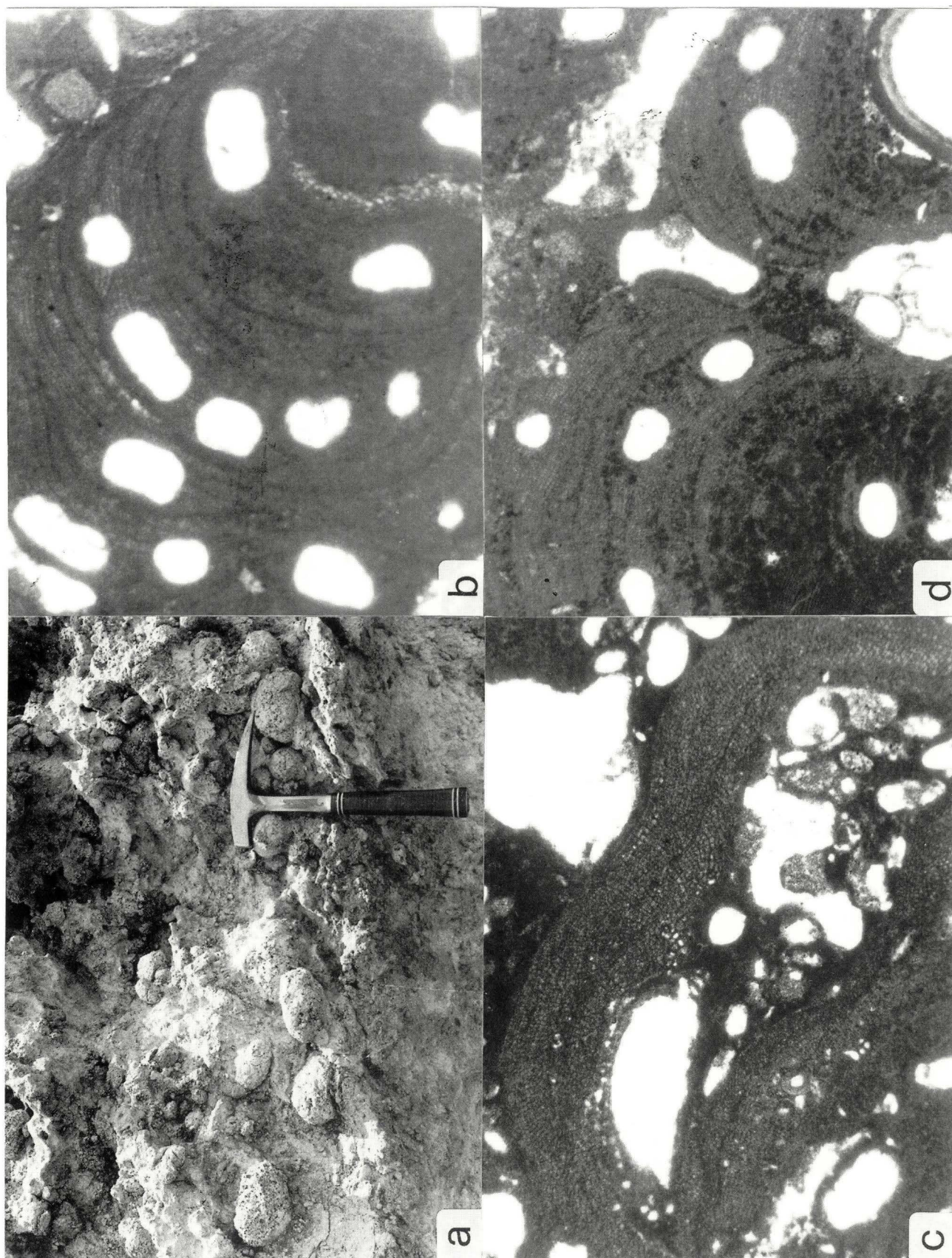
EXPLANATION OF PLATE 1

Fig. a - Detail of the rhodolith pavement.

Fig. b - *Lithothamnion florea brassica* (Millet) Lemoine, x 50.

Fig. c - *Spongites albanensis* (Lemoine) Braga, Bosence & Steneck, x 50.

Fig. d - *Lithothamnion iharai* Ishijima, x 50.



Lithothamnion iharai seems to be the most common species.

CONCLUDING REMARKS

The studied rhodoliths are monospecific to oligospecific and are characterized by a coating sequences dominated by the genus *Lithothamnion*. In each sequence only one species of *Lithothamnion* has been observed; rare thalli of *Titanoderma* and/or *Spongites* and/or *Lithoporella* are randomly intercalated in some rhodoliths.

The algal balls of the Punta Guitja rhodolith pavement exhibits only a superficial resemblance with the Upper Miocene rhodoliths recovered from rhodolith pavements of Malta, which were described as having a *Mesophyllum commune* - dominated assemblage (Bosence & Pedley, 1982; Bosence, 1983b). The *Lithothamnion*-dominated assemblage of the Upper Miocene rhodoliths from Almanzora River Valley, SE Spain (Braga & Martín, 1988) appears to be a reliable analogue of the Punta Guitja rhodoliths, but they differ in having the coating initial stage made by *Lithophyllum racemus* instead of *Lithothamnion*.

The Lower Messinian algal assemblages described by Fravega *et al.* (1994) from the reef slope sediments (Cava dell'Acquabona sequence) and lagoonal deposits (Laguna sequence) of the Rosignano Formation (Tuscany) seem to be a reliable analogue. In fact, the Tuscany assemblages are dominated by *Lithothamnion* and contain the species *Lithothamnion iharai*, *Lithothamnion valens* and *Lithothamnion florea brassica* as a major components.

Finally, the Punta Guitja rhodolith pavement could be regarded as a fossil development of the Coastal Detritic Bottoms (DC) described for the Mediterranean by French bionomists (e.g. Pérès & Picard, 1964). It is noteworthy that the extant species *Lithothamnion valens* is reported by Pérès & Picard (1964) as characteristic member of the "Facies du *Lithothamnium valens*" of the Coastal Detritic Bottoms of the Mediterranean Circalittoral Stage. According to Pérès & Picard (1964) the DC occurs just below the lower limit of the Infralittoral; therefore, *L. valens* seems to be a deep water species. This inference disagrees with the palaeodepth deduced by Grasso & Pedley (1985).

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